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Brookhaven National Laboratory
Service Station Facility

Facility Environmental Monitoring Report

Calendar Year 2000

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Summary of Results*: During CY 2000, high levels of carbon tetrachloride (up to 4,000 µg/L) were detected in a number of wells located upgradient and downgradient of the Service Station. The carbon tetrachloride was released from a former underground storage tank that was used for a Chemistry Department experiment in the 1950s. This tank was located approximately 200 feet northwest (upgradient) of the station. Petroleum hydrocarbons (e.g., xylenes and ethylbenzene) and the solvent tetrachloroethylene were detected in several newly installed monitoring wells located directly downgradient of the station. An evaluation of current operations indicates that the Service Station's underground storage tanks and associated distribution lines are not leaking and that all waste oils and used solvents are being properly stored and recycled. Therefore, it is believed that the petroleum hydrocarbon related compounds and solvents detected in groundwater originate from historical vehicle maintenance and fuel dispensing operations prior to improved chemical storage and handling controls implemented in 1989.*

Background

Building 630 is a commercial automobile service station, which is privately operated under a contract with BNL. The station, which was built in 1966, is used for automobile repair and gasoline sales.

Potential environmental concerns at the Service Station include the historical use of underground storage tanks (USTs) for the storage of gasoline and waste oil, hydraulic fluids used for lift stations, and the use of solvents for parts cleaning. When the service station was built in 1966, the UST inventory consisted of two 8,000 gallon-capacity and one 6,000 gallon-capacity tanks for the storage of gasoline, and one 500 gallon-capacity tank for used motor oil. An inventory discrepancy discovered in 1967, suggested that up to 8,000 gallons of gasoline might have leaked from one of the USTs. There are no records of remedial actions other than the replacement of the tank. In August 1989, the USTs, pump islands and associated piping were upgraded to conform to Suffolk County Article 12 requirements for secondary containment, leak detection devices and overfill alarms. During the removal of the old USTs, there were no obvious signs of soil contamination.

The present tank inventory includes three 8,000 gallon-capacity USTs used for the storage of unleaded gasoline, and one 500 gallon-capacity UST used for waste oil. The facility also has three vehicle lift stations.

Environmental Monitoring Program

In 1996, BNL established a groundwater monitoring program at the Service Station to evaluate potential impacts to environmental quality and to demonstrate compliance with DOE requirements and applicable federal, state and local laws, and regulations. The environmental monitoring program for the Service Station is described in the BNL Environmental Monitoring Plan (Daum *et al*. 2000; BNL, 2001).

Monitoring Results

Groundwater

The Service Station's groundwater monitoring program is designed to confirm that the engineered and institutional controls in place are effective in preventing contamination of the aquifer. Five wells are used to monitor for potential contaminant releases (Figure 1). Three of these wells (085-235, 085-236 and 085-237) were installed in January 2000 to improve BNL's ability to monitor the quality of groundwater in this area.

Groundwater quality in the Service Station area has been impacted by historical small-scale spills of oils, gasoline, and solvents, and by carbon tetrachloride contamination associated with a nearby underground storage tank that was used to store carbon tetrachloride as part of an experiment conducted in the 1950s. In April 1998, BNL removed an underground storage tank from an area located approximately 200 feet to the northwest (upgradient) of the Service Station. Although there are indications that the tank was releasing small quantities of carbon tetrachloride prior to the tank removal, the detection of a significant increase in carbon tetrachloride concentrations in groundwater suggests that additional amounts of this chemical were inadvertently released during the excavation and removal process. This release is currently being remediated as part of the Environmental Restoration program.

Prior to 1999, low levels (<20 μg/L) of carbon tetrachloride were detected in Service Station Well 085-17. Following the April 1998 carbon tetrachloride tank removal, higher levels of carbon tetrachloride started to be detected in Service Station area wells. In 1999, carbon tetrachloride concentrations in Well 085-17 increased to 503 μg/L, and by January 2000 carbon tetrachloride concentrations reached 2,000 μg/L. By June 2000, carbon tetrachloride concentrations in Well 085-17 increased to 4,400 μg/L (Figure 2). The New York State Ambient Water Quality Standard (NYS AWQS) for carbon tetrachloride is 5 μg/L. BNL started to remediate the carbon tetrachloride plume in October 1999. Following the detection of very high levels of carbon tetrachloride in January 2000, the Service Station area wells were incorporated into the Environmental Restoration program's carbon tetrachloride plume monitoring program, and placed on a monthly sampling schedule (Tables 2 through 9).

Petroleum hydrocarbon-related compounds were detected in two of the new wells (Wells 085-236 and 085-237) installed in January 2000 directly downgradient of the Service Station (Tables 1 through 9). These compounds are not detected in upgradient wells. Therefore, the source of the contamination is located close to or beneath the Service Station. No floating petroleum was detected in the monitoring wells.

Primary petroleum hydrocarbon related compounds detected in samples collected from Wells 085-236 and 085-237 during January-May 2000 include: xylenes (up to 420 μg/L), ethylbenzene (up to 77 μg/L), 1,2,4-trimethylbenzene (up to 47 μg/L), 1,3,5-trimethylbenzene (up to 31 μg/L), and naphthalene (up to 32 μg/L). Trace amounts of the gasoline additive MTBE (<5 μg/L) were detected in downgradient Wells 085-236 and 085-237. This compound was also detected in a sample from upgradient Well 085-235. (Note: MTBE has been in use as a gasoline additive since 1977.) Tetrachloroethylene (up to 37 μg/L) was also detected in a number of Service Station area wells, and is probably related to historical degreasing operations. In June 2000, BNL implemented the Groundwater Contingency Plan and formed a technical team to identify the source of the contamination (see discussion below).

During the period of June through October 2000, concentrations of petroleum hydrocarbon-related compounds in samples collected from Well 085-236 and 085-237 decreased to nearly non-detectable levels. During this same period however, levels of petroleum hydrocarbon related compounds increased in Well 085-17 from near non-detectable levels to concentrations well above NYS AWQS. By October 2000, samples from Well 085-17 had total xylene concentrations of 120 μg/L, 1,2,4-trimethylbenzene concentrations at 21.6 μg/L, 1,3,5-trimethylbenzene at 12.7 μg/L, and naphthalene at 4.0 μg/L. The shift in the detection of petroleum hydrocarbon related contaminants from Well 085-236 to Well 085-17 corresponds to a change in groundwater flow direction from southeast to south that began in June-July 2000. This change in flow direction was caused by the operation of the nearby carbon tetrachloride extraction wells.

In April 2000, the Environmental Restoration program installed two additional wells (085-238 and 095-183) approximately 200 feet downgradient of the Service Station in an effort to better characterize the extent of carbon tetrachloride contamination. Results from the initial sampling of these wells in early June indicated carbon tetrachloride up to 2,080 μg/L and tetrachloroethylene up to 12.6 μg/L. The lack of petroleum hydrocarbon compounds at this distance away from the Service Station is consistent with the findings of numerous studies on petroleum hydrocarbon spills, where it has been found that compounds such as xylenes, ethylbenzene, 1,2,4-trimethylbenzene, and naphthalene degrade rapidly and, therefore, do not migrate great distances from source areas.

Evaluation of Current Operations

Following the discovery of petroleum hydrocarbon related chemicals in monitoring wells located downgradient of the Service Station, BNL conducted an investigation into the current operations of the station. The investigation found that the contamination is not

related to current operations. Based upon an evaluation of the electronic leak detection system monitoring and daily product reconciliation (i.e., an accounting of the volume of gasoline stored in underground storage tanks and volume of gasoline sold), there are no indications that the underground storage tanks or associated piping are leaking. Furthermore, if the contaminants were related to a recent (significant) gasoline spill, it would be expected that groundwater samples would indicate high levels of benzene, toluene and the gasoline additive MTBE. The investigation also found that all waste oils and used solvents generated from current operations are being properly stored and recycled (Sack, 2000).

The Service Station was constructed with a number of floor drains that drained to an oil/water separator prior to discharge to the BNL Sanitary System. Although the floor drains were sealed in 1990, the oil/water separator was not abandoned at that time. As part of the June 2000 investigation, the oil/water separator was inspected and found filled with a lightweight oil/solvent. The fact that the oil/water separator remained full after ten years after the sealing of the floor drains indicates that that portion of the drain system was not leaking. The integrity of the remaining portion of the floor drain system during its time of operation (i.e., 1966-1990) cannot be determined using currently available information.

The oil/water separator was pumped out on July 6, 2000. Approximately 55 gallons of liquid and two drums of soil/sludge were removed from the oil/water separator. The liquid and sludge were analyzed for hazardous waste characteristics to determine the appropriate means of disposal. Analytical results indicated high levels of halogenated and aromatic compounds (Zimmerman, 2000). A soil sample was taken adjacent to the separator to assess any leakage from the separator into the ground. Analysis of the sample indicated low-level petroleum hydrocarbon contamination, but at concentrations well below Suffolk County Action Levels (Zimmerman, 2000). BNL has proposed abandoning the oil/water separator in-place by filling the device with sand and concrete. Regulatory agency approval for this action is pending.

Future Monitoring Actions

The following actions are recommended for the CY 2001 monitoring period:

- Maintain the groundwater monitoring program on its current semiannual schedule.
- The Environmental Restoration program will evaluate the full extent of carbon tetrachloride plume migration and determine whether there is a need to expand the groundwater treatment system.

References

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Volatile Organic Compound Analytical Results for January 28 - February 7, 2000
Table 1

Compound	NYS AWQS (µg/L)	Well 085-235 (b) (µg/L)	Well 085-017 (µg/L)	Well 085-236 (b) (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	990.0	2,140.0	122D	752
Methylene chloride**	5	<0.5	0.6B	0.6	<0.5
Chloroform**	7	10.4	7.4	7.5	5.1
Toluene	5	<0.5	<0.5	2.7	<0.5
Tetrachloroethylene (PCE)	5	2.2	4.6	23.7	20.8
Ethylbenzene	5	<0.5	<0.5	11.7	1.7
m,p-Xylenes	5	<0.5	<0.5	31.3	34.9
o-Xylene	5	<0.5	<0.5	77.8	44.7
Isopropylbenzene	5	<0.5	<0.5	<0.5	<0.5
n-propylbenzene	5	<0.5	<0.5	9.0	<0.5
1,3,5-Trimethylbenzene	5	<0.5	<0.5	16.8	14.9
1,2,4-Trimethylbenzene	5	<0.5	<0.5	2.9	12.5
Naphthalene	10	<0.5	<0.5	13.1	3.6
Methyl tertiary butyl ether (MTBE)	50(a)	NA	NA	NA	NA
Total VOC Concentration	--	1,004	2,152	642	1,075

Note 1: February 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
(b): Samples from Wells 085-235 and 085-236 were inadvertently misidentified (i.e., switched) in the field.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for February 23, 2000
Table 2

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	970 D	2,820 D	165	1,360 D
Methylene chloride**	5	7.6	9.9	4.6 J	10.2
Chloroform**	7	12.3	10.4	11.8	8.8
Toluene	5	<5	<5	3.1 J	<5
Tetrachloroethylene (PCE)	5	<5	3.2 J	22.2	18.3
Ethylbenzene	5	<5	<5	20.2	<5
m,p-Xylenes	5	<5	<5	85.3	24.5
o-Xylene	5	<5	<5	99.9	25.4
Isopropylbenzene	5	<5	<5	7.8	<5
n-propylbenzene	5	<5	<5	14	<5
1,3,5-Trimethylbenzene	5	<5	<5	30.7	12.4
1,2,4-Trimethylbenzene	5	<5	<5	17	11.7
Naphthalene	10	<5	<5	9.0	<5
Methyl tertiary butyl ether (MTBE)	50(a)	NA	NA	NA	NA
Total VOC Concentration	--	989	2,843	790	1,522

Note 1: February 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for March 27, 2000
Table 3

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	780.0 D	3,820.0 D	560.0 D	3,430.0 D
Methylene chloride**	5	0.5 B	0.6 B	1.2 B	0.8 B
Chloroform**	7	7.5	10.9	17.9	13.9
Toluene	5	<0.5	<0.5	5.6	<0.5
Tetrachloroethylene (PCE)	5	1.5	5.6	36.3	12.3
Ethylbenzene	5	<0.5	<0.5	76.8	<0.5
m,p-Xylenes	5	<0.5	<0.5	221 D	9.4
o-Xylene	5	<0.5	<0.5	199 D	8.2
Isopropylbenzene	5	<0.5	<0.5	16.2 D	<0.5
n-propylbenzene	5	<0.5	<0.5	29.5	1.8
1,3,5-Trimethylbenzene	5	<0.5	<0.5	<0.5	8.6
1,2,4-Trimethylbenzene	5	<0.5	<0.5	46.8	16.6
1-Methylethylbenzene	5	<0.5	<0.5	16.8	1.7
Naphthalene	10	<0.5	<0.5	31.8	1.4
Methyl tertiary butyl ether (MTBE)	50(a)	NA	NA	NA	NA
Total VOC Concentration	--	789	3,837	1,015	3,504

Note 1: March 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for April 19, 2000
Table 4

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	604.0 D	2,200.0 D	364.0 D	2,170.0 D
Methylene chloride**	5	<0.5	<0.5	<0.5	<0.5
Chloroform**	7	8.0	15.2	25.0	13.8
Toluene	5	<0.5	<0.5	1.4	<0.5
Tetrachloroethylene (PCE)	5	1.4	7.7	18.7	7.9
Ethylbenzene	5	<0.5	<0.5	29.6	<0.5
m,p-Xylenes	5	<0.5	<0.5	120.0	3.5
o-Xylene	5	<0.5	<0.5	65.3	3.8
Isopropylbenzene	5	<0.5	<0.5	<0.5	<0.5
n-propylbenzene	5	<0.5	<0.5	6.2	<0.5
1,3,5-Trimethylbenzene	5	<0.5	<0.5	22.2	3.5
1,2,4-Trimethylbenzene	5	<0.5	<0.5	38.1	9.5
1-Methylethylbenzene	5	<0.5	<0.5	3.6	1.3
Naphthalene	10	<0.5	<0.5	6.7	1.0 J
Methyl tertiary butyl ether (MTBE)	50(a)	4.9 J	NA	4.3 J	1.0 J
Total VOC Concentration	--	613	2,222	897	2,766

Note 1: April 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for June 5, 2000
Table 5

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	503. D	4,440.0 D	469.0 D	820.0 D
Methylene chloride**	5	<0.5	<0.5	<0.5	<0.5
Chloroform**	7	7.2	48.8	8.1	5.9
Toluene	5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene (PCE)	5	1.2	9.1	12.3	4.5
Ethylbenzene	5	<0.5	<0.5	0.8	<0.5
m,p-Xylenes	5	<0.5	<0.5	3.0	<0.5
o-Xylene	5	<0.5	<0.5	11.0	<0.5
Isopropylbenzene	5	<0.5	<0.5	<0.5	<0.5
n-propylbenzene	5	<0.5	<0.5	<0.5	<0.5
1,3,5-Trimethylbenzene	5	<0.5	<0.5	5.5	<0.5
1,2,4-Trimethylbenzene	5	<0.5	<0.5	<0.5	<0.5
Naphthalene	10	<0.5	<0.5	1.4	<0.5
Methyl tertiary butyl ether (MTBE)	50(a)		NA		
Total VOC Concentration	--	511	4,499	512	830

Note 1: June 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for July 7, 2000
Table 6

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	228 D	3,300 D	940	713
Methylene chloride**	5	<0.5	1.1	<5.0	<5.0
Chloroform**	7	3.1	45.8	9.1	5.0
Toluene	5	<0.5	0.5	<5.0	<5.0
Tetrachloroethylene (PCE)	5	0.7	12.0	10.2	4.5 J
Ethylbenzene	5	<0.5	1.8	<5.0	<5.0
m,p-Xylenes	5	<0.5	6.0	9.5	<5.0
o-Xylene	5	<0.5	4.2	4.8	<5.0
n-propylbenzene	5	<0.5	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene	5	<0.5	<5.0	<5.0	<5.0
1,2,4-Trimethylbenzene	5	<0.5	3.7 J	3.7 J	<5.0
Naphthalene	10	<0.5	<5.0	<5.0	<5.0
Methyl tertiary butyl ether (MTBE)	50(a)	NA	NA	NA	NA
Total VOC Concentration	--	232	3,373	977	718

Note 1: July 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for August 1, 2000
Table 7

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	443 D	2,830 D	494 D	809
Methylene chloride**	5	0.3 JB	1.7	<0.5	4.6
Chloroform**	7	8.6	64.7	5.3	6.4
Toluene	5	1.0	2.4	1.0	1.0 J
Tetrachloroethylene (PCE)	5	1.0	15.4	7.0	2.7 J
Ethylbenzene	5	<0.5	<0.5	<0.5	<1.0
m,p-Xylenes	5	<0.5	51.3	<0.5	<2.0
o-Xylene	5	<0.5	24.3	0.3 J	<1.0
n-propylbenzene	5	<0.5	0.5	<0.5	<5.0
1,3,5-Trimethylbenzene	5	<0.5	6.2	<0.5	<5.0
1,2,4-Trimethylbenzene	5	<0.5	13.1	<0.5	<5.0
Naphthalene	10	<1.0	0.5	<1.0	<1.0
Methyl tertiary butyl ether (MTBE)	50(a)	3.1	<5.0	3.3 J	5.2
Total VOC Concentration	--	457	3,010	511	824

Note 1: August 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride

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Volatile Organic Compound Analytical Results for September 6, 2000
Table 8

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	378 D	3,280 D	479 D	539
Methylene chloride**	5	<0.5	0.7	<0.5	<5.0
Chloroform**	7	8.7	58.9	6.5	5.5
Toluene	5	<0.5	0.9	<0.5	<5.0
Tetrachloroethylene (PCE)	5	1.0	13.0	7.2	2.9 J
Ethylbenzene	5	<0.5	<0.5	<0.5	<5.0
m,p-Xylenes	5	<0.5	18.5	<0.5	<5.0
o-Xylene	5	<0.5	17.0	<0.5	<5.0
n-propylbenzene	5	<0.5	<0.5	<0.5	<5.0
1,3,5-Trimethylbenzene	5	<0.5	3.3	<0.5	<5.0
1,2,4-Trimethylbenzene	5	<0.5	4.5	<0.5	<5.0
Naphthalene	10	<0.5	0.3 J	<0.5	<5.0
Methyl tertiary butyl ether (MTBE)	50(a)	NA	NA	NA	NA
Total VOC Concentration	--	388	3,397	493	547

Note 1: September 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.

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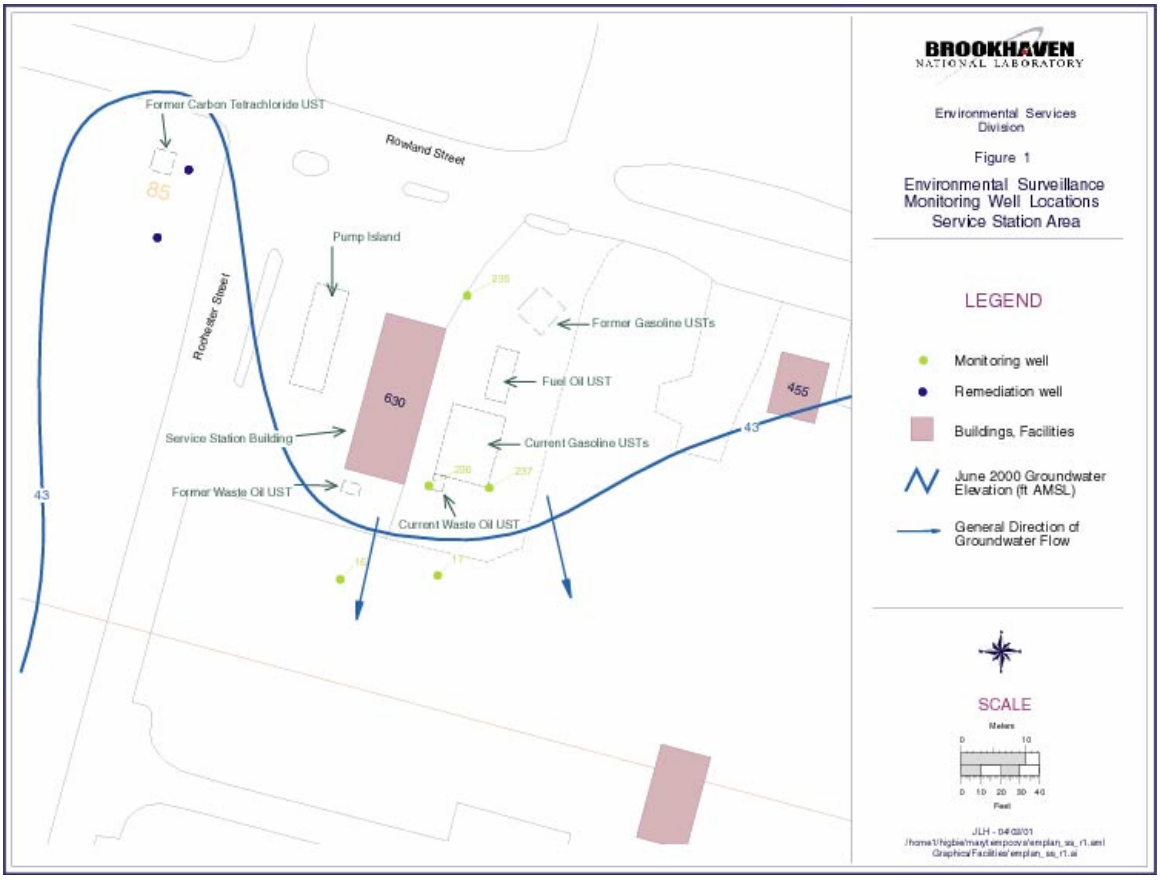
Volatile Organic Compound Analytical Results for October 30, 2000
Table 9

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	244	2,930 D	418 D	395 D
Methylene chloride**	5	<0.5	<0.5	<0.5	<0.5
Chloroform**	7	5.5	60.8	6.6	5.3
Toluene	5	<0.5	3.5	<0.5	<0.5
Tetrachloroethylene (PCE)	5	0.8 J	25.9	7.0	3.4
Ethylbenzene	5	<0.5	0.6	<0.5	<0.5
m,p-Xylenes	5	<0.5	48.1	<0.5	<0.5
o-Xylene	5	<0.5	72.3	<0.5	<0.5
n-propylbenzene	5	<0.5	2.2	<0.5	<0.5
1,3,5-Trimethylbenzene	5	<0.5	12.7	<0.5	<0.5
1,2,4-Trimethylbenzene	5	<0.5	21.6	<0.5	<0.5
Naphthalene	10	1.1	4.0	<0.5	<0.5
Methyl tertiary butyl ether (MTBE)	50(a)	4.2 J	0.4 J	4.0 J	15.9
Total VOC Concentration	--	256	3,182	436	420

Note 1: October 2000 groundwater samples collected by BNL Environmental Restoration Division – OU III Carbon Tetrachloride Plume Removal Action.
Note 2: Only primary contaminants shown. Other compounds may have been detected, but at concentrations generally < 5 µg/L.
(a): New York State Drinking Water Standard.
B: Compound also detected in blank sample.
J: Estimated analytical value.
D: Analytical value following dilution.
NA: Compound not analyzed for.
**: Primary breakdown products of carbon tetrachloride.


BROOKHAVEN
NATIONAL LABORATORY
Environmental Services
Division
Figure 1
Environmental Surveillance
Monitoring Well Locations
Service Station Area
Former Carbon Tetrachloride UST
Rowland Street
85
Pump Island
Rochester Street
235
Former Gasoline USTs
Fuel Oil UST
630
455
43
Service Station Building
Current Gasoline USTs
236
237
Former Waste Oil UST
Current Waste Oil UST
16
17
LEGEND
Monitoring well
Remediation well
Buildings, Facilities
June 2000 Groundwater
Elevation (ft AMSL)
General Direction of
Groundwater Flow
SCALE
Meters
0
10
0
10
20
30
40
Feet
JLH - 04/03/01
/home1/higbie/maytenpcovs/emplan_ss_r1.aml
Graphics/Facilities/emplan_ss_r1.ai